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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/786,790

02/25/2004

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CU-3608

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EXAMINER

ANDERSON, JAMES D

ART UNIT

PAPER NUMBER

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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/786,790	<b>Applicant(s)</b> KOBAYASHI, HIRONORI	
	<b>Examiner</b> JAMES D. ANDERSON	<b>Art Unit</b> 1614	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 19 June 2009.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 5 and 22-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 5 and 22-27 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |                                                                                      |                                                                   |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                     | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____                                                          | 6) <input type="checkbox"/> Other: _____                          |

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## **DETAILED ACTION**

### ***Formal Matters***

Applicants' response and amendments to the claims, filed 6/19/2009, are acknowledged and entered. Claims 5 and 22-27 are pending and under examination.

### ***Response to Arguments***

Applicants' arguments have been fully and carefully considered but they are not deemed to be persuasive. Rejections and/or objections not reiterated from previous office actions are hereby withdrawn. The following rejections and/or objections are either reiterated or newly applied. They constitute the complete set presently being applied to the instant application.

### ***Claim Objections***

The previous objection to claim 5 is **withdrawn** in light of Applicant's amendments to claim 5.

### ***Claim Rejections - 35 USC § 112 – 2<sup>nd</sup> Paragraph***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

The rejection of claims 5 and 22-27 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention regarding the metes and bounds of the formula  $\text{Si}_n\text{O}_{n-1}(\text{OR})_{2n+2}$ , is **withdrawn** in light of Applicant's amendments.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person

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having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 5 and 22-27 remain rejected under 35 U.S.C. § 103(a) as being unpatentable over **Kobayashi *et al.*** (EP 0 932 081 A1; Published July 28, 1999) (cited by Applicant in IDS filed 4/12/2007) in view of **Yoichi *et al.*** (JP 2000-053421; Published February 22, 2000) (cited by Applicant in IDS filed 4/12/2007).<sup>1</sup>

The claims are drawn to a method of producing a coating solution for forming a wettability-varied pattern, comprising mixing a neutral solution of titanium oxide, which contains titanium oxide and an alkyl silicate having the formula  $\text{Si}_n\text{O}_{n-1}(\text{OR})_{2n+2}$ , wherein R is an alkyl group, with a solution of hydrolyzed fluoroalkylsilane having the formula  $\text{Y}_n\text{SiX}_{(4-n)}$ , wherein Y is a fluoroalkyl group, X is alkoxy, acetyl, or halogen, and n is 0 to 3, and wherein the pH of the coating solution is in a range of 5 to 9.

Kobayashi *et al.* teach methods of varying the wettability of layers on a substrate comprising applying a photocatalyst material (page 31, ¶ [0286]). The photocatalyst material is preferably titanium oxide (page 31, ¶ [0288]). The photocatalyst-containing layer may also contain a binder, preferably the instantly claimed polysiloxane containing a fluoroalkyl group, specifically hydrolysis condensates of fluoroalkylsilanes (page 32, ¶ [0295]). It is noted that the polysiloxanes containing fluoroalkyl groups listed on pages 32-33 of Kobayashi meet the limitations of the claimed hydrolyzed fluoroalkylsilanes (*e.g.*,  $\text{CF}_3(\text{CF}_2)_3\text{CH}_2\text{CH}_2\text{Si}(\text{OCH}_3)_3$ ). In fact, Kobayashi explicitly teaches organopolysiloxanes composed mainly of a hydrolysis condensate of compounds represented by formula  $\text{Y}_n\text{SiX}_{(4-n)}$ , wherein Y is an alkyl, fluoroalkyl, vinyl, amino, or epoxy group, X is methoxy, ethoxy, acetyl, or halogen, and n is 1 to 3 ([0293]). Kobayashi teaches that the use of polysiloxanes containing fluoroalkyl groups as binders results in markedly improved water repellency and oil repellency of the photocatalyst-containing layer (page 33, ¶ [0296]).

With respect to mixing a solution of titanium oxide and fluoroalkylsilicate as recited in claim 5, Kobayashi teaches that the photocatalyst (*e.g.*, titanium oxide) and binder (*e.g.*, fluoroalkylsilicate) are “dispersed in a solvent to prepare a coating liquid” ([0332]).

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<sup>1</sup> A machine translation of Yoichi was provided with the previous Office Action

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The Kobayashi *et al.* reference does not teach a solution of titanium dioxide containing an alkyl silicate or that the solution is at a neutral pH.

However, Yoichi *et al.* teach methods of preparing a titanium oxide solution having superior dispersibility in a neutral pH range for use as a photocatalyst, a catalyst, catalyst support, adsorbent, an ultraviolet ray absorbent, paint, or bulking agent (Abstract). A titanium oxide solution is mixed with an alkyl silicate as a dispersion stabilizer and the resultant mixture is neutralized to prepare the objective titanium oxide solution (*id.*).

With respect to the claimed alkyl silicates, Yoichi teaches alkyl silicates having the same structure as those claimed ([0009] of provided machine translation).

With respect to the pH of 5 to 9 as recited in claim 5 and the claimed weight ratio of 0.7 to 10 as recited in claim 24, Yoichi teach the same pH range and weight ratio as claimed (Abstract; [0006] of provided machine translation).

With respect to diluting with a hydrophilic solvent as recited in claims 26 and 27, Yoichi teaches that the titanium oxide sol and/or the alkyl silicate of the invention can be blended with a hydrophilic solvent and still maintain excellent dispersion stability ([0010] and [0014] of provided machine translation).

The titanium oxide/alkyl silicate solutions taught in Yoichi are further taught to be useful as photocatalysts as also taught by Kobayashi *et al.* ([0019] of provided machine translation).

Yoichi does not teach adding a fluoroalkyl silane to the titanium oxide/alkyl silicate solutions taught therein.

However, it would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to apply the technique of mixing titanium oxide and an alkyl silicate at a neutral pH as taught in Yoichi *et al.*, to improve the dispersibility of the titanium oxide in the fluoralkylsilane-containing solutions of Kobayashi *et al.* The resulting coating solution would predictably have increased dispersibility at a neutral pH, which would clearly aid in applying said containing coating solutions to a substrate so as to induce varied wettability as taught in Kobayashi *et al.*

With respect to the pH of the solution of hydrolyzed fluoroalkylsilane solution (*i.e.*, 2 to 7) as recited in claim 22, Yoichi teach solutions of titanium oxide and alkyl silicates having a **final pH of 5 to 9**. As such, it would be obvious to adjust the pH of the fluoralkylsilane solution

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such that addition of this solution to the titanium oxide and alkyl silicate solution of Yoichi would result in a final solution having a pH of 5 to 9.

With respect to the ratio of neutral sol solution of titanium oxide to the solution of hydrolyzed fluoralkylsilane as recited in claim 23, no unobviousness is seen in varying the ratio of these solutions. While Kobayashi does not explicitly teach a ratio of titanium oxide to fluoralkylsilane, the reference does teach that the photocatalyst (*e.g.*, titanium oxide) in the photocatalyst-containing layer is preferably 5 to 60% by weight, more preferably 20 to 40% by weight ([0291]). Accordingly, it would have been obvious to add a binder such as a fluoralkylsilane as taught in Kobayashi in a range of 95 to 40% by weight, more preferably 80 to 60% by weight (*i.e.*, the remaining weight percentage), which amount falls within the ratio of 1:0.1 to 1 as recited in claim 23 (titanium oxide:fluoralkylsilane). It is noted that Example C-1 of Kobayashi provides a solution comprising 2 g of an inorganic coating composition for a photocatalyst and 0.3 g of a fluoroalkylsilane, *i.e.*, a ratio of 1:0.15 ([0562], and Example D-1 of Kobayashi provides a solution comprising 2 g titanium oxide and 0.15 g of a fluoroalkylsilane, *i.e.*, a ratio of 1:0.075 ([0595]).

#### *Response to Arguments*

Applicant traverses the instant rejection, stating that the reason why titanium oxide has excellent dispersibility in the titanium oxide sol of Yoichi *et al.* is because alkyl silicate stabilizes the dispersibility of titanium oxide during the hydrolyzation process. Thus, Applicant argues, even if the titanium oxide sol, where the alkyl silicate is contained as a hydrolyzed state, is added to the composition of Kobayashi *et al.*, the dispersibility of titanium oxide could not be improved because alkyl silicate is hydrolyzed prior to its addition to the composition (page 4 of Applicant's Response). In response, the Examiner respectfully submits that both Kobayashi *et al.* and Yoishi *et al.* disclose compositions useful as photocatalysts. Kobayashi *et al.* discloses photocatalysts containing titanium oxide and a fluoroalkylsilane and Yoishi *et al.* discloses photocatalysts containing a titanium dioxide sol having superior dispersibility at neutral pH formed by mixing titanium oxide with an alkyl silicate. As such, the Examiner is not persuaded by Applicant's arguments regarding the dispersibility of the titanium oxide sol of Yoishi *et al.* The skilled artisan would have been motivated to use the titanium oxide sol of Yoishi *et al.* as the source of

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titanium oxide in the photocatalyst materials suggested by Kobayashi *et al.* because of its improved dispersibility at neutral pH as disclosed in Yoichi *et al.* There is nothing in Yoichi *et al.* to suggest that this improved dispersibility of titanium oxide requires a hydrolyzation step. Given the fact that both Kobayashi and Yoichi teach the use of titanium oxide as a photocatalyst, the Examiner is not persuaded that the state of hydrolysis of the alkyl silicate taught in Yoichi has any bearing on the obviousness of the claimed coating solutions. In fact, Yoichi explicitly teaches that the titanium oxide sol solutions prepared by mixing titanium dioxide and the claimed alkyl silicates are especially useful as photocatalysts ([0019] of machine translation provided 3/25/2008).

Applicant further argues that the dispersion stabilization function of alkyl silicate to titanium oxide “would have been exhausted” during the preparation process of the titanium oxide sol. Therefore, Applicant argues, even if the titanium oxide was added to the composition wherein titanium oxide and fluoroalkylsilane are mixed, no further dispersion stabilization of titanium oxide could be generated. Applicant alleges that even if the skilled artisan takes this method, unlike the present invention, he would not be able to obtain a coating solution having excellent dispersibility of titanium oxide. It is not apparent to the Examiner how one skilled in the art could take this method and *not* obtain a coating solution having excellent dispersibility of titanium oxide as alleged by Applicant. The same steps required to arrive at Applicant’s claimed method are precisely the steps suggested and motivated by the prior art as discussed above. One cannot carry out the same steps and arrive at compositions having different properties. Furthermore, Applicant has presented no factual evidence to support the allegation that carrying out the steps suggested and motivated by the cited prior art does not result in a coating solution having excellent dispersibility of titanium oxide.

Applicant’s arguments above are predicated on one skilled in the art first hydrolyzing a mixture of titanium oxide and alkyl silicate prior to mixing with a fluoroalkylsilane. However, one skilled in the art would recognize the benefit of using a titanium oxide with improved stability and dispersibility (as taught in Yoichi *et al.*) in the preparation of the photocatalysts taught in Kobayashi *et al.* (*i.e.*, photocatalysts comprised of a mixture of titanium oxide and a fluoroalkylsilane). As such, there is nothing in the cited prior art to suggest that the mixture of titanium oxide and alkyl silicate taught in Yoichi *et al.* to improve the stability and dispersibility

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of titanium oxide in neutral solution need be hydrolyzed prior to mixing with a fluoroalkylsilane as suggested and motivated by Kobayashi *et al.*

Accordingly, the claims are deemed properly rejected for the reasons of record and as reiterated above.

### ***Conclusion***

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to JAMES D. ANDERSON whose telephone number is (571)272-9038. The examiner can normally be reached on MON-FRI 9:00 am - 5:00 pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ardin Marschel can be reached on 571-272-0718. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



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/James D Anderson/

Examiner, Art Unit 1614